

1 IAP20 Rec'd PCT/PTO 10 FEB 2006

Carrier based on granules produced from pyrogenically
prepared silicon dioxides

The present invention relates to the use of granules of
5 pyrogenic silica as carriers. In addition to various other
actions, the granules can have the function of a carrier
for foodstuffs additives, such as dyestuffs, antioxidants,
preservatives, emulsifiers, gelling agents, thickeners and
binders, stabilizers, alkalis, acids, salts, antilumping
10 agents, flavour intensifiers, sweeteners, aromas,
feedstuffs additives, chemical intermediates and plant
protection agents, such as, for example, herbicides,
insecticides, fungicides and others.

It is known to employ spherical silicon dioxide particles
15 as carriers, for example for feedstuffs additives (Sipernat
22, Bulletin Pigments No. 31, "Synthetic Silica as a Flow
Acid and Carrier Substance", Degussa AG).

Disadvantages of the abovementioned silicon dioxide
20 particles which are employed as carriers are their high
water content, their too low purity and the poor flow
properties of the loaded substance. Silicic acid esters,
silica sols or silicates are employed as starting
compounds, and then often lead to products of which the
25 purity is not adequate for the desired intended uses
because of considerable amounts of salts, so that an
expensive washing is necessary.

The invention is therefore based on the object of providing
spherical silicon dioxide particles for use as carriers
30 which do not have the disadvantages mentioned and moreover
meet the high demands of uses in respect of purity, product
safety and flow properties.

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The invention provides the use of granules based on pyrogenically prepared silicon dioxide as a carrier for substances chosen from the group consisting of foodstuffs additives, such as dyestuffs, antioxidants, preservatives, emulsifiers, gelling agents, thickeners and binders, stabilizers, alkalis, acids, salts, antilumping agents, flavour intensifiers, sweeteners, aromas, feedstuffs additives, chemical intermediates and plant protection agents, such as herbicides, insecticides, fungicides and others.

The invention also provides an adsorbate of granules based on pyrogenically prepared silicon dioxide and at least one substance chosen from the group consisting of foodstuffs additives, such as dyestuffs, antioxidants, preservatives, emulsifiers, gelling agents, thickeners and binders, stabilizers, alkalis, acids, salts, antilumping agents, flavour intensifiers, sweeteners, aromas, feedstuffs additives, chemical intermediates and plant protection agents, such as herbicides, insecticides and fungicides.

The granules based on pyrogenically prepared silicon dioxide preferably have an average particle diameter of 10 to 120 μm and a BET surface area of 40 to 400 m^2/g (determination in accordance with DIN 66 131 with nitrogen).

The silicon dioxide granules furthermore preferably have the following physico-chemical characteristic data, which are determined as described in EP PS 0 725 037:

Pore volume: 0.5 to 2.5 ml/g

Pore size distribution: less than 5% of the total pore volume has a pore diameter of less than 5 nm, remainder meso- and macropores

pH: 3.6 to 8.5

Tamped density: 220 to 700 g/l.

Granules which are suitable for the use according to the invention and the preparation thereof are described, for example, in EP OS 0 727 037.

The granules can preferably have meso- and macropores, the
5 volume of the mesopores making up 10 to 80% of the total volume. The particle size distribution of the granules is preferably 80 vol.% larger than 8 μm and 80 vol.% smaller than 96 μm . In a preferred embodiment of the invention, the content of pores smaller than 5 μm is not more than 5%,
10 based on the total pore volume.

The granules employed according to the invention can be prepared, for example, by dispersing pyrogenically prepared silicon dioxide, preferably silicon dioxide prepared from silicon tetrachloride by means of flame hydrolysis, in
15 water, spray drying the dispersion and optionally then heat-treating the resulting granules at a temperature of 150 to 1,100°C for a period of 1 to 8 h.

The dispersion in water preferably has a concentration of silicon dioxide of 5 to 25 wt.%, more preferably 5 to about
20 19.9 wt.%. The spray drying can be carried out at a temperature of 200 to 600°C, and disc atomizers or nozzle atomizers can be employed in this context. The heat treatment of the granules can be carried out either in a static bed, such as, for example, in chamber ovens, or in
25 an agitated bed, such as, for example, rotary tubular dryers.

The pyrogenic silicon dioxide serving as the starting compound is prepared by a process in which a volatile silicon compound is injected into an oxyhydrogen gas flame
30 of hydrogen and air. Silicon tetrachloride is used in most cases. This substance hydrolyses to silicon dioxide and hydrochloric acid under the influence of the water formed during the oxyhydrogen gas reaction. After leaving the flame the silicon dioxide enters into a so-called

coagulation zone, in which the silicon dioxide primary particles and primary aggregates agglomerate. The product present as a type of aerosol in this stage is separated from the gaseous concomitant substances in cyclones and then after-treated with damp hot air. The residual hydrochloric acid content can be lowered to below 0.025% by this process.

The granules based on pyrogenically prepared silicon dioxide can be silanized. The carbon content of the granules is then preferably 0.3 to 15.0 wt.%. Halogenosilanes, alkoxysilanes, silazanes and/or siloxanes can be employed for the silanization.

The following substances can be employed in particular as halogenosilanes:

15 Halogeno-organosilanes of the type $X_3Si(C_nH_{2n+1})$
X = Cl, Br
n = 1 - 20

Halogeno-organosilanes of the type $X_2(R')Si(C_nH_{2n+1})$
20 X = Cl, Br
R' = alkyl
n = 1 - 20

Halogeno-organosilanes of the type $X(R')_2Si(C_nH_{2n+1})$
25 X = Cl, Br
R' = alkyl
n = 1 - 20

Halogeno-organosilanes of the type $X_3Si(CH_2)_m-R'$

X = Cl, Br

m = 0, 1 - 20

R' = alkyl, aryl (e.g. -C₆H₅)

-C₄F₉, -OCF₂-CHF-CF₃, -C₆F₁₃, -O-CF₂-CHF₂

5 -NH₂, -N₃, -SCN, -CH=CH₂,

-OOC(CH₃)C=CH₂

-OCH₂-CH(O)CH₂

—NH—CO—N—CO—(CH₂)₅—

-NH-COO-CH₃, -NH-COO-CH₂-CH₃, -NH-(CH₂)₃Si(OR)₃

10 -S_x-(CH₂)₃Si(OR)₃

Halogeno-organosilanes of the type (R)₂Si(CH₂)_m-R'

X = Cl, Br

R = alkyl

m = 0, 1 - 20

15 R' = alkyl, aryl (e.g. -C₆H₅)

-C₄F₉, -OCF₂-CHF-CF₃, -C₆F₁₃, -O-CF₂-CHF₂

-NH₂, -N₃, -SCN, -CH=CH₂,

-OOC(CH₃)C = CH₂

-OCH₂-CH(O)CH₂

—NH—CO—N—CO—(CH₂)₅—

20 -NH-COO-CH₃, -NH-COO-CH₂-CH₃, -NH-(CH₂)₃Si(OR)₃

-S_x-(CH₂)₃Si(OR)₃

Halogeno-organosilanes of the type (R)₂X Si(CH₂)_m-R'

X = Cl, Br

25 R = alkyl

m = 0.1 - 20

R' = alkyl, aryl (e.g. -C₆H₅)

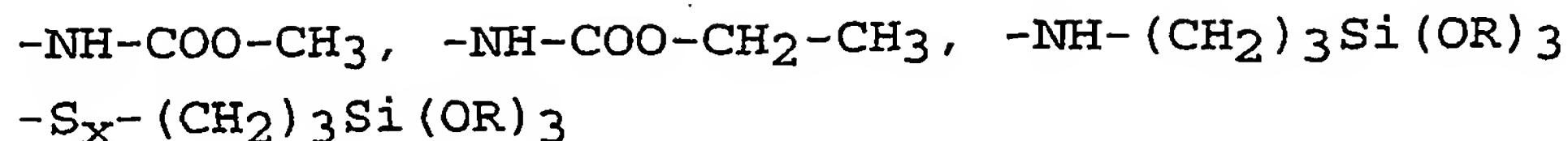
-C₄F₉, -OCF₂-CHF-CF₃, -C₆F₁₃, -O-CF₂-CHF₂

-NH₂, -N₃, -SCN, -CH=CH₂,

30 -OOC(CH₃)C = CH₂

-OCH₂-CH(O)CH₂

—NH—CO—N—CO—(CH₂)₅—



The following substances can be employed in particular as alkoxysilanes:

5 Organosilanes of the type $(\text{RO})_3\text{Si}(\text{C}_n\text{H}_{2n+1})$

R = alkyl

n = 1 - 20

Organosilanes of the type $\text{R}'_x(\text{RO})_y\text{Si}(\text{C}_n\text{H}_{2n+1})$

R = alkyl

10 R' = alkyl

n = 1 - 20

x+y = 3

x = 1, 2

y = 1, 2

15 Organosilanes of the type $(\text{RO})_3\text{Si}(\text{CH}_2)_m-\text{R}'$

R = alkyl

m = 0, 1 - 20

R' = alkyl, aryl (e.g. $-\text{C}_6\text{H}_5$)

$-\text{C}_4\text{F}_9$, $\text{OCF}_2-\text{CHF}-\text{CF}_3$, $-\text{C}_6\text{F}_{13}$, $-\text{O}-\text{CF}_2-\text{CHF}_2$

20 $-\text{NH}_2$, $-\text{N}_3$, $-\text{SCN}$, $-\text{CH}=\text{CH}_2$,

$-\text{OOC}(\text{CH}_3)\text{C}=\text{CH}_2$

$-\text{OCH}_2-\text{CH}(\text{O})\text{CH}_2$

$-\text{NH}-\text{CO}-\text{N}-\text{CO}-(\text{CH}_2)_5-$

$-\text{NH}-\text{COO}-\text{CH}_3$, $-\text{NH}-\text{COO}-\text{CH}_2-\text{CH}_3$, $-\text{NH}-(\text{CH}_2)_3\text{Si}(\text{OR})_3$

25 $-\text{S}_x-(\text{CH}_2)_3\text{Si}(\text{OR})_3$

Organosilanes of the type $(\text{R}'')_x(\text{RO})_y\text{Si}(\text{CH}_2)_m-\text{R}'$

R'' = alkyl

x+y = 2

30 x = 1, 2

$y = 1, 2$

$R' = \text{alkyl, aryl (e.g. } -C_6H_5)$

$-C_4F_9, -OCF_2-CHF-CF_3, -C_6F_{13}, -O-CF_2-CHF_2$

$-NH_2, -N_3, -SCN, -CH=CH_2,$

5 $-OOC(CH_3)C = CH_2$

$-OCH_2-CH(O)CH_2$

$-NH-CO-N-CO-(CH_2)_5$

$-NH-COO-CH_3, -NH-COO-CH_2-CH_3, -NH-(CH_2)_3Si(OR)_3$

$-S_x-(CH_2)_3Si(OR)_3$

- 10 The silane Si 108 $[(CH_3O)_3Si-C_8H_{17}]$ trimethoxyoctylsilane can preferably be employed as the silanizing agent.

The following substances can be employed in particular as silazanes:

Silazanes of the type:



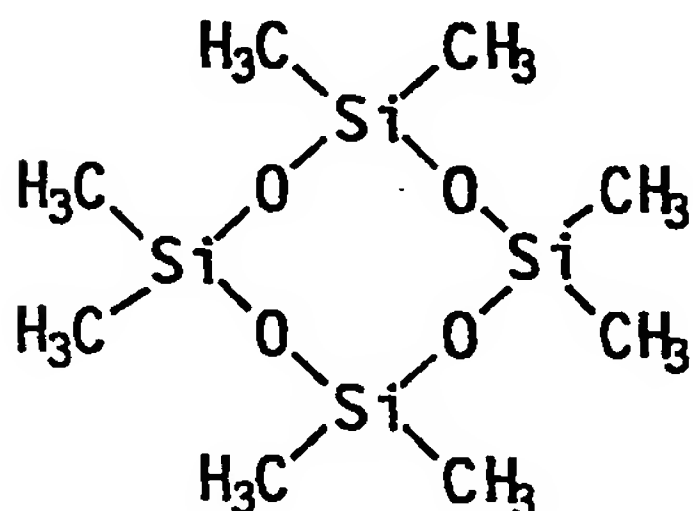
$R = \text{alkyl}$

$R' = \text{alkyl, vinyl}$

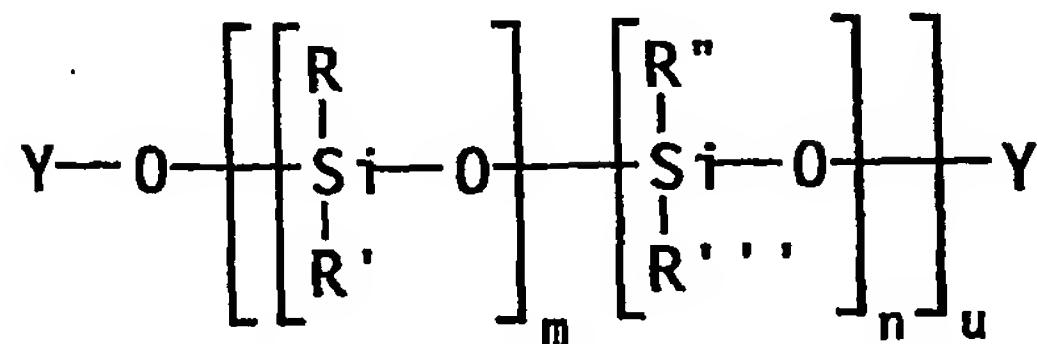
and, for example, hexamethyldisilazane.

- 20 The following substances can be employed in particular as siloxanes:

Cyclic polysiloxanes of the type D 3, D 4, D 5, e.g. octamethylcyclotetrasiloxane = D 4



Polysiloxanes or silicone oils of the type:



R = alkyl, aryl, $(CH_2)_n - NH_2$, H

R' = alkyl, aryl, $(CH_2)_n - NH_2$, H

5 R'' = alkyl, aryl, $(CH_2)_n - NH_2$, H

R''' = alkyl, aryl, $(CH_2)_n - NH_2$, H

Y = CH_3 , H, C_nH_{2n+1} where $n=1-20$

Y = $Si(CH_3)_3$, $Si(CH_3)_2H$

$Si(CH_3)_2OH$, $Si(CH_3)_2(OCH_3)$

10 $Si(CH_3)_2(C_nH_{2n+1})$ where $n=1-20$

m = 0, 1, 2, 3, ... ∞

n = 0, 1, 2, 3, ... ∞

u = 0, 1, 2, 3, ... ∞

15 The silanization can be carried out by a procedure in which the granules are sprayed with the silanizing agent, which can optionally be dissolved in an organic solvent, such as, for example, ethanol, and the mixture is then heat-treated at a temperature of 105 to 400°C over a period of 1 to 6 h.

20 An alternative method of the silanization of the granules can be carried out by a procedure in which the granules are treated with the silanizing agent in vapour form and the mixture is then heat-treated at a temperature of 200 to 800°C over a period of 0.5 to 6 h. The heat treatment can
25 be carried out under an inert gas, such as, for example, nitrogen.

The silanization can be carried out continuously or batchwise in heatable mixers and dryers with spray devices. Suitable devices can be, for example: plough share mixers
30 or plate, fluidized bed or flow-bed dryers.

By varying the starting substances, the conditions during spraying, the heat treatment and the silanization, the physico-chemical parameters of the granules, such as the specific surface area, the particle size distribution, the pore volume, the tamped density and the silanol group concentration, pore distribution and pH, can be modified within the stated limits.

The invention also provides:

- 10 - Dyestuff comprising granules based on pyrogenically prepared silicon dioxide.
- Antioxidant comprising granules based on pyrogenically prepared silicon dioxide.
- Preservative comprising granules based on pyrogenically prepared silicon dioxide.
- 15 - Emulsifier comprising granules based on pyrogenically prepared silicon dioxide.
- Gelling agent comprising granules based on pyrogenically prepared silicon dioxide.
- Thickener comprising granules based on pyrogenically prepared silicon dioxide.
- 20 - Binder comprising granules based on pyrogenically prepared silicon dioxide.
- Stabilizer comprising granules based on pyrogenically prepared silicon dioxide.
- 25 - Alkali comprising granules based on pyrogenically prepared silicon dioxide.
- Acids comprising granules based on pyrogenically prepared silicon dioxide.

- Salts comprising granules based on pyrogenically prepared silicon dioxide.
- Antilumping agent comprising granules based on pyrogenically prepared silicon dioxide.
- 5 - Flavour intensifier comprising granules based on pyrogenically prepared silicon dioxide.
- Sweetener comprising granules based on pyrogenically prepared silicon dioxide.
- 10 - Aroma comprising granules based on pyrogenically prepared silicon dioxide.
- Feedstuffs additives comprising granules based on pyrogenically prepared silicon dioxide.
- Chemical intermediates comprising granules based on pyrogenically prepared silicon dioxide.
- 15 - Plant protection agents comprising granules based on pyrogenically prepared silicon dioxide.
- Herbicides comprising granules based on pyrogenically prepared silicon dioxide.
- 20 - Insecticides comprising granules based on pyrogenically prepared silicon dioxide.
- Fungicides comprising granules based on pyrogenically prepared silicon dioxide.

Foodstuffs additives can be:

Dyestuffs, such as, for example:

- E100 Curcumin
- E101 Riboflavin, Lactoflavin
- 5 E102 Tartrazine
- E104 Quinoline Yellow
- E110 Sunset Yellow S (azo dyestuff)
- E120 Carminic acid, Cochineal
- E122 Azorubine (azo dyestuff)
- 10 E123 Amaranth (azo dyestuff)
- E124 Ponceau 4R (azo dyestuff)
- E127 Erythrosine
- E131 Patent Blue V
- E132 Indigotine, Indigo Carmine
- 15 E140 Chlorophylls a + b
- E141 Chlorophylls und Chlorophyllins,
copper complexes
- E142 Acid Brilliant Green BS
- E150 Caramel, Sugar colour, Rum colour
- 20 E151 Brilliant Black BN (azo dyestuff)
- E153 Charcoal, medicinal
- E160 Carotenoids
- E160a Beta-Carotene, Gamma-Carotene
- E160b Bixin, Norbixin, (Annatto), Orlean
- 25 E160c Capsanthin, Capsorubin
- E160d Lycopene
- E160e Beta-Apo-8'-Carotenal (C30)
- E160f Beta-Apo-8'-Carotenoic Acid Ethyl Ester
- E161 Xanthophylls
- 30 E161a Flavoxanthin
- E161b Lutein
- E161c Cryptoxanthin
- E161d Rubixanthin
- E161e Violaxanthin
- 35 E161f Rhodoxanthin

5 E161g Canthaxanthin
E162 Betanin, Beetroot Red
E163 Anthocyan
E172 Iron oxide, iron hydroxide
E173 Aluminium
E174 Silver
E175 Gold
E180 Pigment Rubine BK, Lithol Rubine

10 Antioxidants can be:

E220 Sulfurous acid, sulfur dioxide
E221 Sodium sulfite
E222 Sodium hydrogen sulfite
E223 Sodium disulfite
15 E224 Potassium disulfite
E300 Ascorbic acid
E301 Sodium ascorbate
E302 Calcium ascorbate
E304 Ascorbyl palmitate
20 E306 Tocopherol-containing extracts of natural
origin
E307 alpha-Tocopherol
E308 gamma-Tocopherol
E309 delta-Tocopherol
25 E310 Propyl gallate
E311 Octyl gallate
E312 Dodecyl gallate
E320 Butylhydroxyanisole (BHA)
E321 Butylhydroxytoluene (BHT)
30 E330 Citric acid
E331 Sodium citrate
E332 Potassium citrate
E333 Calcium citrate
E472c Citric acid esters
35 Ethoxyquin

Preservatives can be:

- E200 Sorbic acid
- E201 Sodium sorbate
- E202 Potassium sorbate
- 5 E203 Calcium sorbate
- E210 Benzoic acid
- E211 Sodium benzoate
- E212 Potassium benzoate
- E213 Calcium benzoate
- 10 E214 Ethyl 4-hydroxybenzoate
- E215 Ethyl 4-hydroxybenzoate, sodium salt
- E216 Propyl 4-hydroxybenzoate
- E217 Propyl 4-hydroxybenzoate, sodium salt
- E218 Methyl 4-hydroxybenzoate
- 15 E219 Methyl 4-hydroxybenzoate, sodium salt
- E220 Sulfurous acid, sulfur dioxide
- E221 Sodium sulfite
- E222 Sodium hydrogen sulfite
- E223 Sodium disulfite
- 20 E224 Potassium disulfite
- E236 Formic acid
- E280 Propionic acid
- E281 Sodium propionate
- E282 Calcium propionate
- 25 E283 Potassium propionate

Emulsifiers can be:

- E322 Lecithin
- E442 Ammonium salts of phosphatidic acids
- E471 Edible fatty acids, mono- and
- 30 diglycerides
- E472 Esters of E471
- E472a Acetic acid esters
- E472b Lactic acid esters
- E472c Citric acid esters
- 35 E472d Tartaric acid esters

- 5 E472e Diacetyltartaric acid esters
E472f Tartaric-acetic acid esters
E473 Sucrose esters of edible fatty acids
E474 Sugar glycerides
E475 Polyglycerol esters of edible fatty acids
E476 Polyglycerol esters of polycondensed
ricinoleic acid
E477 Propylene glycol esters of edible fatty
acids
10 E481 Sodium stearylactylate
E482 Calcium stearylactylate
E487 Sodium lauryl sulfate

15 Gelling agents, thickeners and binders and stabilizers can
be:

- E400 Alginic acid
E401 Sodium alginate
E402 Potassium alginate
E403 Ammonium alginate
20 E404 Calcium alginate
E405 Propylene glycol alginate
E406 Agar-agar
E407 Carrageenan
E410 Carob bean flour
25 E412 Guar flour
E413 Tragacanth
E414 Gum arabic
E415 Xanthan
E416 Karaya gum
30 E417 Tara gum
E440 Pectins
E460a Cellulose, microcrystalline
E460b Cellulose, powdered
E461 Methylcellulose
35 E463 Hydroxypropylcellulose

	E464 Hydroxypropylmethycellulose
	E465 Methylethylcellulose
	E466 Carboxymethylcellulose
	E551 Silicon dioxide
5	E1411 Di-starch phosphate I
	E1412 Di-starch phosphate II
	E1413 Di-starch phosphate, phosphated
	E1414 Di-starch phosphate, acetylated
	E1420 Mono-starch acetate I
10	E1421 Mono-starch acetate II
	E1422 Di-starch adipate, acetylated
	E1423 Di-starch glycerol, acetylated
	E1430 Di-starch glycerol
	E1440 Hydroxypropyl-starch
15	E1441 Hydroxypropyl-di-starch glycerol
	E1442 Hydroxypropyl-di-starch phosphate

Alkalies, acids and salts can be:

	E170 Calcium carbonate
20	E260 Acetic acid
	E261 Potassium acetate
	E262 Sodium diacetate
	E263 Calcium diacetate
	E270 Lactic acid
25	E296 Malic acid
	E325 Sodium lactate
	E326 Potassium lactate
	E327 Calcium lactate
	E330 Citric acid
30	E331 Sodium citrate
	E332 Potassium citrate
	E333 Calcium citrate
	E334 Tartaric acid
	E335 Sodium tartrate
35	E336 Potassium tartrate

	E337 Potassium sodium tartrate
	E354 Calcium tartrate
	E338 Orthophosphoric acid
	E339 Sodium orthophosphate
5	E340 Potassium orthophosphate
	E341 Calcium orthophosphate
	E343 Magnesium orthophosphate
	E350 Sodium malate
	E351 Potassium malate
10	E352 Calcium malate
	E450 Salts of di-, tri- and polyphosphoric acid (di-, tri- and polyphosphates)
	E500 Sodium carbonate
	E501 Potassium carbonate
15	E503 Ammonium carbonate
	E504 Magnesium carbonate
	E507 Hydrochloric acid
	E508 Potassium chloride
	E509 Calcium chloride
20	E510 Ammonium chloride
	E514 Sodium sulfate
	E515 Potassium sulfate
	E516 Calcium sulfate
	E524 Sodium hydroxide
25	E525 Potassium hydroxide
	E526 Calcium hydroxide
	E527 Ammonium hydroxide
	E528 Magnesium hydroxide
	E529 Calcium oxide
30	E530 Magnesium oxide
	E541 Sodium aluminium phosphate
	E574 Gluconic acid
	E575 Glucono-delta-lactone
	E576 Sodium gluconate
35	E577 Potassium gluconate
	E578 Calcium gluconate

Antilumping agents can be:

- 5 E170 Calcium carbonate
 E341 Calcium orthophosphate
 E470 Edible fatty acids, sodium, potassium and
 calcium salts
 E504 Magnesium carbonate
 E535 Sodium ferrocyanide
 E536 Potassium ferrocyanide
 E538 Calcium ferrocyanide
10

Flavour intensifiers can be:

- E621 Sodium glutamate
 E622 Potassium glutamate
15 E623 Calcium glutamate
 E624 Magnesium glutamate
 E625 Ammonium glutamate
 E627 Sodium guanylate
 E628 Potassium guanylate
 E629 Calcium guanylate
20 E630 5'-Inosinic acid
 E631 Sodium inosinate
 E632 Potassium inosinate
 E633 Calcium inosinate

25

Sweeteners can be:

- E950 Acesulfame-K
 E951 Aspartame
 E952 Cyclamate
30 E954 Saccharin
 E957 Thaumatin

Aromas:

	Abriceine
	Acetanisole cryst.
	Acetophenone pure
5	Agar wood D50092NS
	Agrumen aldehyde 6947L
	Agrumex HC
	Agrumex LC
	Agrumovort 10897 C/J
10	Aldehyde C 6 nat.
	Aldehyde C11 MOA
	Aldehyde C12 MNA
	Aldehyde C14 so-called
	Aldehyde C16 so-called
15	Aldehyde C18 so-called/Abricolin
	Alcohol C 6 nat.
	Alcohol C 8
	Alcohol C 9
	Alcohol C10
20	Alcohol C12
	Allinat/Allyl isothiocyanate
	Allinat/Allyl isothiocyanate (stab.)
	Allyl caproate
	Allyl caproate kosher
25	Allyl cyclohexylpropionate
	Allyl heptylate
	Allyl phenoxyacetate
	Amarocit ®
	Ambre 83LN DB10028
30	Ambrebois D50407
	Ambrettia C
	Ambrettolide
	Ambrinol S
	Ambroxid cryst.
35	Ananas Coeur D50214
	Anethol NPU 21/22°C

Anethol supra 21.5°C
Anisaldehyde pure
Anisyl alcohol
Anisole
5 Anisyl acetate
Apple 74180C PM
Apriconia 28855P extra PM
Baldrian Identoil B
Basilicum Synthesence
10 Bay Identoil
Benzalacetone
Benzaldehyde
Benzaldehyde dd
Benzophenone cryst.
15 Benzyl acetate
Benzyl acetone
Benzyl alcohol dd
Benzyl alcohol FR
Benzyl benzoate H&R
20 Benzyl benzoate M
Benzyl cinnamate
Benzyl formate
Benzyl propionate
Benzyl salicylate
25 Bergamot Identoil colourless
Bergamot Synthesence Afric.
Blackberry D50260E
Bois de Cachemire D50008
Bois Doux 78008SP PM
30 Boronal
Butyric acid nat.
Butyl butyrate
Cacao et Chocolat D50546B
Cajeput Identoil
35 Calmus Synthesence asarone-free
Cananga Identoil
Capric acid nat.

Caproic acid nat.
Caramel acetate
Cardamom R Identoil
Cardamom Synthessence
5 Cassia Identoil
Cassia Identoil B dark
Cassis D50060B
Cedar Leaves Identoil
Chloracetophenone para
10 Chrysantheme
Cinnamyl acetate
Citral FF
Citron R
Citrone Synthessence FF
15 Citronella Identoil
Citronell Identoil
Citronellyl tiglinat
Citronitrile
Citrowanil® B
20 Citrozone D50620B
Citrylal
Citrylal E
Clarifruit D50757
Clarion Base D50774
25 Coriander Identoil
Corps 98N DB10025
Corps Racine VS
Costus Synthessence
Coumarone
30 Cumin Synthessence
Cypress Identoil
Damascenone beta nat. 1% in EtOH
Datilat
Decalactone gamma nat.
35 Decalyl acetate beta
Diacetyl nat.
Dibenzosuberone

Dibenzosuberone
Dibenzyl ether
Diethyl phthalate (DEP)
Dihydrocoumarin
5 Dimethyl anthranilate
Dimethyl benzyl carbiny l butyrate
Dimethyl sulfide nat.
Diphenyl oxide
Silver Fir Needle Identoil
10 Silver Fir Needle Identoil B
Oak Moss Resin D50342
Strawberry D50026C
Acetic acid nat.
Estragon Identoil
15 Ethoxyfuranone
Ethyl 2-methylbutyrate nat.
Ethyl 2-methylbutyrate
Ethyl acetate nat.
Ethyl acetoacetate
20 Ethyl benzoate
Ethyl butyrate
Ethyl butyrate nat.
Ethyl caproate kosher
Ethyl caproate nat.
25 Ethyl caprylate
Ethyl caprylate nat.
Ethyl cinnamate
Ethyl formate
Ethyl heptylate
30 Ethyl isovalerate
Ethyl phenylacetate
Ethyl propionate
Ethyl salicylat
Eucalyptol
35 Eucalyptus Oil Globulus BP
Eugenol
Eugenol methyl ether

Farenal
Fennel oil techn.
Feuilles de Tomate 79569PM
Spruce Green 8001S
5 Spruce Needle Identoil B sib.
Spruce Needle Identoil sib.
Filbertone G
Fir Balsam DM
Fleur de Cassis SBU PM
10 Floropal
Florophyll 10183
Fragolane
Framboson 10583F
Frutinat
15 Galbanum Synthessence
Galbanum Synthresin B
Geranium Identoil Afric.
Geranium Identoil Bourbon
Geranyl tiglinat
20 Globalide 100%
Globanone 50% DEP
Globanone 50% DPG
Globanone 50% IPM
Grapefruit D50075N
25 Grapefruit Identoil D61286G
Green Honey Melon D50315
Guave 10875N
Helichrysum Synthessence
Herbaflorat
30 Hexyl acetate
Hexyl acetate nat.
Hexyl salicylate
Hydrocitronitrile
Indian Spice 10898
35 Indoflor H&R cryst.
Indole FF
Ginger oil spec. D40393S

Ionone pure 100%
Iris Synthresin H&R
Irolene P
Isoamyl acetate G
5 Isoamyl acetate nat.
Isoamyl butyrate
Isoamyl butyrate nat.
Isoamyl isobutyrate nat.
Isoamyl isovalerate
10 Isoananate
Isobornyl acetate
Isobutyric acid nat.
Isobutyl acetat nat.
Isobutylquinoline
15 Isobutylquinoline 54
Isoeugenol methyl ether
Isotabac naturelle LN DB10038
Jasmaprunat
Camomile Identoil blue
20 Camomile rom. Synthessence
Pine Needle Identoil
Pine Needle Identoil B
Pine Needle Identoil B P
Kiwi D50195PM
25 Cresol methyl ether para
Lactojasmon
Lavandin Identoil 30/32%
Lavandin Identoil type French 30/32%
Lavandin Provence D50817
30 Lavender Identoil type Mt. Blanc 40/42%
Lavender oil type Mt. Blanc 40/42%
Leguminal
Limonene d pure
Loganberry D50398N PM
35 Bay Leaf Oil D50286
Mace Oil extra
Macrolide®

Macrolide® supra
Madranol
Magnolan
Majantol
5 Mandaril
Manderine Synthessence
Mango D50436PM
Maracuja D50042E PM
Marjoliane N DB10018
10 Mayciane N DB10023
Melissa Identoil German so-called
Menthol D dist.
Menthol liquid
Menthol rac.
15 Menthol rac. PH
Menthol-1 dest.
Menthol-1 H&R compacted
Menthol oil
Menthone-1/Isomenthone-d
20 Menthyl acetate-1
Metaxa D50247C
Methyl ethylpyrazine-2,3
Methyl 2-methylbutyrate
Methylacetophenone para
25 Methylacetophenone para supra
Methyl anthranilate
Methyl benzoate H&R
Methyl benzoate techn. pure
Methyl betanaphthyl ketone cryst.
30 Methylbutyric acid-2 nat.
Methyl cinnamate
Methyl phenylacetate
Methyl salicylate
Methyl cinnamaldehyde alpha
35 Miel Blanc N DB10024
Musk Seed Synthessence
Mugetanol

Mugofleur D50444PM
Clary Sage Identoil
Clary Sage Identoil B
Carnation Flower Identoil
5 Clove Leaf Identoil dark
Clove Leaf Oil deg.
Neononyl acetate
Neroli Identoil
Nerolin Yara Yara cryst.
10 Neroli oil 4663
Olibanum Synthresin
Orange Identoil TSA
Orange oil spec. D40393P
Origanum Identoil
15 Oryclon extra
Oryclon special
Osmanthia 353
Ozonil
Palisandal
20 Palisandin
Palmarosa Synthessence
Pastinak Synthessence
Patchouli Synthessence N
Patchouli oil deg. DM
25 Pear D50313A PM
Peru Balsam Identoil
Peru balsam art. H&R
Petitgrain Bigarade Synthessence
Petitgrain Identoil R
30 Peach D40110PM
Plum D50424
Phenirate
Phenoxyethyl alcohol/arosol
Phenylacetaldehyde 100%
35 Phenylacetaldehyde dimethyl acetal
Phenylethyl acetate
Phenylethyl alcohol benzyl alcohol-free

Phenylethyl alcohol pure
Phenylethyl cinnamate cryst.
Phenylethyl isobutyrate
Phenylethyl phenylacetate
5 Phenylpropyl alcohol
Pimento Identoil
Pineapple acetate
Poivre Coeur H&R PM
Poivron N DB10029
10 Prenyl acetate
Prenyl salicylate
Profarnesal
Projasmon P
Propionic acid nat.
15 Propyl acetate nat.
Prunol N DB10027
Pyroprunat
Rain Forest D50339C PM
Resedafol
20 Rosaphen
Rose Booster D50221A
Rose F50048R PG
Rosemary Identoil
Rosemary Identoil Spanish
25 Rosewood Braz. Identoil
Sage Identoil Span.
Sage Identoil Span.
Sandalwood S.E.A. D50820
Sandel 80
30 Sandel extra
Sandel Forte
Sandel H&R
Sandel H&R ECO
Sandel H&R super
35 Sandel SP
Sandel type East Ind.
Sandalwood type East Ind.

	Sandolene H&R
	Spike Identoil
	Styrax Identoil D50186
	Styrenyl acetate
5	Sweet Amber D50807
	Tobacco aroma H&R D50799
	Teatree D50780A
	Thyme Identoil
	Thyme red Identoil
10	Thyme Synthabsolue
	Thymol dist.
	Thymol cryst. H&R
	Thymol cryst. PH
	Tonca Synthresin
15	Vanillin nat.
	Verbena Identoil type French
	Verdeflora D50375D
	Verdural F
	Vertocitral
20	Vertocitral C
	Vertosine
	Vetiver Identoil J
	Juniper berry Identoil 10900
	Juniper berry Synthessence
25	Willow fragrance 6103CB HG
	Wintergreen oil
	Ylang 10372 MT
	Ylang Ylang Identoil Bourbon I
	Ylang Ylang Identoil Bourbon II
30	Ylang Ylang Identoil Bourbon III
	Cinnamaldehyde
	Cinnamaldehyde nat.
	Cinnamyl alcohol
	Cinnamon leaf Identoil
35	Cinnamon bark Identoil

Feedstuffs additives can be:

Choline chloride solution
Vitamin E acetate
Formic acid
5 Acetic acid
Propionic acid
Phosphoric acid
Fat concentrates
Ethoxiquin
10 Molasses
Hop extract
Tagetese extract
Lecithin
Whey
15 Calcium formiate
Urea
Milk substitute
Trace elements
Vitamins

20

Chemical intermediates can be:

1,2-Propylene glycol
Acrylic acid
Adipic acid
25 Adipic anhydride
Formic acid
Formic anhydride
Benzoic acid
Succinic acid
30 Butanoic acid
Butanoic anhydride
Caproic acid
Dimer fatty acid
Dimer fatty acid anhydride

	Dipentaerythritol
	Erucic acid
	Acetic acid
	Acetic anhydride
5	Ethylene glycol
	Fumaric acid
	Glutaric acid
	Glycerol
	Isophthalic acid
10	Isophthalic anhydride
	Lauric acid
	Linolenic acid
	Linoleic acid
	Maleic acid
15	Maleic anhydride
	Malonic acid
	Myristic acid
	Oleic acid
	Oxalic acid
20	Palmitic acid
	Pentaerythritol
	Phthalic acid
	Phthalic anhydride
	Propionic acid
25	Stearic acid
	Terephthalic acid
	Terephthalic anhydride
	Trimethylolpropane
	Valeric acid
30	Bisphenol A
	Epichlorohydrin
	o-Cresol
	Phenol novolaks
	Styrene
35	α -Methylstyrene
	Vinyltoluene
	Methyl methacrylate

	Divinylbenzene
	Diallyl phthalate
	Diisocyanates
	Toluene-diisocyanates
5	Cyclohexanone
	Methylcyclohexanone
	Acetone
	Butanone
	Acetophenone
10	Indene
	Coumarone (benzofuran)
	2-Methylindene
	2-Methylcoumarone
	Methylstyrene
15	Cyclopentadiene
	Dicyclopentadiene
	Heteropolysaccharides
	Arabinose
	Galactose
20	Glucuronic acid
	Mannose
	Rhamnose
	Xylose
	Resinol acids
25	Resinols
	Resinotannols
	Resenes
	Terpenes
	Diterpenes
30	Triterpenes
	Sesquiterpenes
	Resin esters
	Resin soaps
	Alcohols
35	Phenol derivatives
	Hydroquinone derivatives
	Quinoline derivatives

Naturally occurring resins:

	Acaroid resin
	Asa foetida
	Benzoin resin
5	Amber
	Bitumen
	Canada balsam
	China lacquer
	Copaiva balsam
10	Dammar resin
	Dragon's blood resin
	Elemi
	Galbanum
	Gutti
15	Jalap resin
	Japan lacquer
	Kauri copal
	Colophony
	Copal
20	Labdanum
	Manila copal
	Mastix
	Myrrh
	Olibanum
25	Opoponax
	Pernambuco balsam
	Peru balsam
	Sandarac
	Shellac
30	Styrax
	Tolu balsam
	Terpentine

Synthetic resins:

	Hydrocarbon resins
35	Urea resins

Alkyd resins
Epoxy resins
Melamine resins
Melamine-formaldehyde resins
5 Hexamethylolmelamine resins
Melamine-phenol resins
Melamine-urea resins
Phenolic resins
Polyester resins
10 Unsaturated polyester resins
Polyurethane resins
Ketone resins
Coumarone-indene resins
Isocyanate resins
15 Polyamide resins
Terpene-phenol resins
Epoxy resins
Rubber

Additives:

20 Wetting agents
Desiccants
Antifloating agents
Antiskinning agents
Hardening accelerators
25 Hardening retardants
Expanding agents
Sealants
Water softeners
Deoxygenating agents
30 Buffers
Polishing agents
Antiageing agents
Antioxidants
Antiozonants
35 Plasticizers

	Deodorizers
	Inhibitors
	Passivating agents
	Pickling inhibitors
5	Anticorrosion agents
	Antistatics
	Stabilizers
	Release agents
	Lubricants
10	Flameproofing agents
	UV absorbers
	Antiknocking agents
	Corrosion inhibitors
	Metal deactivators
15	Carburettor cleaning agents
	Residue converters
	Antiicing agents
	Pour point depressors
	Defoamers
20	Lubricity improvers
	Optical brighteners
	Antifoams:
	Anionic surfactants
	Polyethylene ethers
25	Polypropylene glycol ethers
	Pluronic®
	Mixed ethers

Inorg. peroxides:

5 Hydrogen peroxide
Lithium peroxide
Sodium peroxide
Calcium peroxide
Strontium peroxide
Barium peroxide

Org. peroxides:

10 Di-tert-butyl peroxide
Dibenzoyl peroxide
Per-acids
Per-acid esters
Ketone peroxides
Epidioxides
15 Ascaridol
Ergosterol peroxide

Stabilizers:

Ethylenediaminetetraacetic acid
Magnesium silicate

20 Plasticizers:

Camphor
Trimellitic acid
Phosphoric acid esters
Azelaic acid esters
25 Sebacic acid esters
Chloroparaffins
Dioctyl phthalate
Bis-(2-ethylhexyl) phthalate
Diisononyl phthalate
30 Diisodocetyl phthalate
Phthalic acid esters
Dibutyl phthalate

Diisobutyl phthalate
Dicyclohexyl phthalate
Dimethyl phthalate
Diethyl phthalate
5 Benzyl butyl phthalate
Butyl octyl phthalate
Butyl deyl phthalate
Dipentyl phthalate
Dimethylglycol phthalate
10 Dicapryl phthalate
Trimellitic acid esters
Tris-(2-ethylhexyl) trimellitate
Dioctyl adipate
Bis-(2-ethylhexyl) adipate
15 Diisodecyl adipate
Dibutyl sebacate
Dioctyl sebacate
Bis-(2-ethylhexyl) sebacate
Azelaic acid
20 Sebacic acid
1,3-Butanediol
1,2-Propanediol
1,4-Butanediol
1,6-Hexanediol
25 Tricresyl phosphate
Triphenyl phosphate
Diphenyl cresyl phosphate
Diphenyl octyl phosphate
Bis-(2-ethylhexyl)diphenyl phosphate
30 Tris-(2-ethylhexyl) phosphate
Tris-(2-butoxyethyl) phosphate
Butyl oleate
Butyl stearate
Triethylene glycol bis-(2-ethylbutyrate)
35 Citric acid esters
Acetyltributyl citrate
Acetyltriethyl citrate

Tartaric acid esters
Lactic acid esters
Epoxystearic acid esters
Epoxidized soya oils
5 Linseed oils
Benzenesulfonamides
p-Toluenesulfonamides

Free radical interceptors:

10 Nitrogen monoxide
Bis(trifluoromethyl) nitroxide
Nitroxyl radicals
2,2-Diphenyl-1-picrylhydrazyl
Nitrosobenzene
2-Methyl-2-nitroso-propane
15 Benzaldehyde tert-butyl nitron

Wetting agents can be:

20 Dimethyloctylphosphine oxide
Dimethylnonylphosphine oxide
Dimethyldecylphosphine oxide
Dimethylundecylphosphine oxide
Dimethyldodecylphosphine oxide
N,N,-bis(3-D-gluconamidopropyl)cholamide
N,N-Bis(3-D-gluconamidopropyl)deoxycholamide
25 Dodecylpoly(oxyethylene glycol ether)s,
PEG (23) dodecyl ether,
PEG (10) cetyl alcohol
PEG (20) cetyl alcohol
PEG (10) stearyl alcohol
30 PEG (10) oleyl alcohol
PEG (29) oleyl alcohol
Polyethylene glycol (10) lauryl ether
Polyethylene glycol (8) dodecyl ether
Polyethylene glycol (10) isotridecyl ether

- Polyethyleneglycol (15) isotridecylether
Ethylphenol-poly(ethylene glycol ether)s
Lubrol
Thesit
Thesit
5 Cetylpyridinium chloride
Cetyltrimethylammonium bromide
3-[(3-Cholamidopropyl)dimethylammonio]-1-propanesulfonic
acid
10 3-[(3-Cholamidopropyl)dimethylammonio]-1-
hydroxypropanesulfonic acid
Chenodeoxycholic acid
Cholate, Na+
Deoxycholate, Na+
15 Glycocholate, Na+
Glycodeoxycholate, Na+
Taurocholate, Na+
Taurodehydrocholate, Na+
Taurodeoxycholate, Na+
20 Cyclohexyl-n-ethyl- β -D-maltoside
Cyclohexyl-n-hexyl- β -D-maltoside
Cyclohexyl-n-methyl- β -D-maltoside
n-Decyl- β -D-maltopyranoside
n-Dodecyl-beta-D-maltopyranoside
25 n-Octyl- β -D-maltopyranoside
n-Undecyl- β -D-maltoside
N,N-Dimethyldodecylamine oxide
Genaminox KC
N,N-Dimethyldodecylamine oxide
30 N-Dodecyl-N,N-(dimethylammonio)butyrate
N-Dodecyl-N,N-(dimethylammonio)undecanoate
n-Dodecyl-N,N-dimethylglycine
N-Octyl-N,N-dimethylammonio-3-propanesulfonate
N-Decyl-N,N-dimethylammonio-3-propanesulfonate
35 N-Dodecyl-N,N-dimethylammonio-3-propanesulfonate
N-Tetradecyl-N,N-dimethylammonio-3-propanesulfonate
Decanoylsucrose

- n-Dodecanoylsucrose
Octanoylsucrose
- 5 n-Decyl- β -D-glucopyranoside
Dodecyl- β -D-glucopyranoside
n-Heptyl- β -D-glucopyranoside
n-Hexyl- β -D-glucopyranoside
n-Nonyl- β -D-glucopyranoside
n-Octanoyl- β -D-glucosylamine
n-Octyl-beta-D-glucopyranoside
- 10 n-Decyl- β -D-thiomaltoside
n-Nonyl-beta-D-thiomaltopyranoside
N,N-Bis(3-D-gluconamidopropyl) deoxycholamide
N,N,-bis(3-D-gluconamidopropyl) cholamide
Digitonin
- 15 Bis(2-ethylhexyl) sodium sulfosuccinate
n-Dodecyl-N,N-dimethylglycine
6-O-(N-heptyl-carbamoyl)methyl- α -D-glucopyranoside
N-Dodecanoyl-N-methylglycine
Lauryl-sulfate Li+
- 20 Lauryl-sulfate, Na+
{3-([4-tert-Octyl]-1-propanesulfonic acid, Na+
n-Octanoyl-N-methylglucamide
n-Nonanoyl-N-methylglucamide
n-Decanoyl-N-methylglucamide
- 25 Ethylphenol-poly(ethylene glycol ether)s
n-Octyl-2-hydroxyethylsulfoxide
n-Octyl-2-hydroxyethyl sulfide
n-Octyl-rac-2,3-dihydroxypropylsulfone
n-octyl-rac-2,3-dihydroxypropylsulfoxide
- 30 Polyethylene glycol-polypropylene glycol copolymer
Pluronic F-127
 β -D-Fructopyranosyl-alpha-D-glucopyranoside monodecanoate
 β -D-Fructopyranosyl-alpha-D-glucopyranoside monododecanoate
PEG (9-10) nonylphenol
- 35 PEG (4.5) p-t-octylphenol
PEG (9-10) p-t-octylphenol
PEG (9-10) p-t-octylcyclohexyl

PEG (7-8) p-t-octylphenol
PEG (7-8) t-octylcyclohexyl

Plant protection agents can be:

Herbicides	Insecticides	Fungicides	Other
2,4-D	Abamectin	Acibenzolar	Chlormequat
2,4-DB	Acephate	Azoxystrobin	Chloropicrin
Acetochlor	Acequinocyl	Benalaxyl	Choline Chloride
Acifluorfen	Acetamiprid	Benomyl	Cyclanilide
Aclonifen	Acrinathrin	Bitertanol	Dazomet
Alachlor	Alanycarb	Bromuconazole	Dichlopropene
Alloxidim	Aldicarb	Bupirimate	Dikegulac
Ametryn	Alpha-cypermethrin	Captan	Dimethipin
Amidosulfuron	Amitraz	Carbendazim	Ethepon
Aminotriazole	Azinphos-methyl	Carboxin	Flumetralin
Anilofos	Azocyclotin	Carpropamid	Gibberellic acid
Asulam	Bacillus thuringiensis	Chlorothalonil	Inabenfide
Atrazine	Bendiocarb	Chlozolinate	Maleic hydrazide
Azimsulfuron	Benfuracarb	Copper fungicides	Mepiquat
Benazolin	Bensultap	Cymoxanil	Metam
Benfluralin	Benzoximate	Cyproconazole	Methyl bromide
Benfuresate	Bifenazate	Cyprodinil	Methyl isothiocyanate
Bensulfuron	Bifentrin	Dichlofluanid	Paclobutrazol
Bentazone	BPMC (Fenobucarb)	Diclomezine	Prohexadione
Benzofenap	Bromopropylate	Diethofencarb	Thidiazuron
Bifenox	Buprofezin	Difenoconazole	Triapenthenol
Bilanafos	Cadusafos	Dimethirimol	Tributyl phosphotri-thioate
Bispyribac-sodium	Carbaryl	Dimethomorp	Trinexapac-ethyl
Bromacil	Carbofuran	Diniconazole	Uniconazole
Bromobuthide	Carbosulfan	Dinocap	Fluthiacet - KIH 9201 / CGA 248757
Bromofenoxim	Cartap	Dithianon	

Bromoxynil	Chinomathionat	Dodemorph	
Butachlor	Chlorethoxyfos	Dodine	
Butamifos	Chlorfenapyr	Edifenphos	
Butralin	Chlorfenvinphos	Epoxiconazole	
Butroxydim	Chlorfluazuron	Ethaboxam	
Butylate	Chlormephos	Ethirimol	
Cafenstrole	Chloropirifos	Etridiazole	
Carbentamide	Clofentezine	Famoxadone	
Carfentrazone	Cycloprothirin	Fenarimol	
Chlorbromuron	Cyfluthrin	Fenbuconazole	
Chloridazon	Cyhexatin	Fenhexamid	
Chlorimuron	Cypermethrin	Fenitropan	
Chlorotoluron	Cyromazine	Fenpiclonil	
Chlorsulfuron	Deltamethrin	Fenpropidin	
Chlorthal	Demeton-s-methyl	Fenpropimorph	
Cinidon-ethyl	Diafenthiuron	Fentin	
Cinmethylin	Diazinon	Ferimzone	
Cinosulfuron	Dichlorvos	Fluazinam	
Clefoxydim	Dicofol	Fludioxonil	
Clethodim	Diclotophos	Fluoroimide	
Clodinafop	Di flubenzuron	Fluquinconazole	
Clomazone	Dimethoate	Flusilazole	
Herbicides	Insecticides	Fungicides	PGR
Clomeprop	Disolfoton	Flusulfamide	Aminoethoxy- vinylglycine
Clopyralid	Emamectin benzoate	Flutolanil	Prohydrojasmon - PDJ
Cloransulam- methyl	Endosulfan	Flutriafol	
Cumyluron	Esfenvalerate	Folpet	
Cyanazine	Ethiofencarb	Fosetyl	
Cyclosulfamuron	Ethion	Fuberidazole	
Cycloxidim	Ethoprophos	Furalaxyl	
Cyhalofop-butyl	Etofenprox	Furametpyr	
Daimuron	Etoxazole	Guazatine	
Desmedipham	Etrimfos	Hexaconazole	

Desmetryn	Fenamiphos	Hymexazol	
Dicamba	Fenazaquin	Imazalil	
Dichlobenil	Fenbutatin oxide	Imibenconazole	
Dichlorprp	Fenitrothion	Iminoctadine	
Diclofop	Fenothiocarb	Ipconazole	
Diclosulam	Fenoxycarb	Iprobenfos	
Difenzoguat	Fenpropthrin	Iprodione	
Di flufenican	Fenpyroximate	Iprovalicarb	
Di flufenzopyr	Fenthion	Isoprothiolane	
Dimefuron	Fenvalerate	Kasugamycin	
Dimepiperate	Fipronil	Kresoxim-methyl	
Dimethachlor	Flubroythirinate	Mancozeb	
Dimethenamid	Flucycloxuron	Maneb	
Diphenamid	Flucythrinate	Mepanipyrin	
Diquat	Flufenoxuron	Mepronil	
Dithiopyr	Flutenzine	Metalaxyl	
Diuron	Fluvalinate	Metconazole	
Endothal	Formetanate	Methasulfocarb	
EPTC	Formothion	Metiram	
Esprocarb	Fosthiazate	Myclobutanil	
Ethalfluralin	Furathiocarb	Nitrothal-isopropyl	
Ethametsulfuron	Halfenbrox	Nuarimol	
Ethofumesate	Halofenozide	Oxadixyl	
Ethoxyfen	Hexaflumuron	Oxine-copper	
Ethoxysulfuron	Hexythiazox	Oxolinic acid	
Etobenzanid	Imidacloprid	Oxycarboxin	
Fenoxaprop	Indoxacarb	Pefurazoate	
Flamprop-M	Isofenphos	Penconazole	
Flazasulfuron	Isoprocarb	Pencycuron	
Fluazifop	Isoxathion	Phthalide	
Flufenacet	Lambda-cyhalothrin	Probenazole	
Flumetsulam	Lindane (Gamma-HCH)	Prochloraz	
Flumiclorac-	Lufenuron	Procymidone	

pentyl			
Flumioxazin	Malathion	Propamocarb	
Fluometuron	Metaldehyde	Propiconazole	
Fluoroglycofen	Methamidophos	Propineb	
Flupoxam	Methidathion	Pyrazophos	
Flupyrsulfuron	Methiocarb	Pyrifenox	
Herbicides	Insecticides	Fungicides	Nematicides
Flurenol	Methomyl	Pyrimethanil	ZA3274
Fluridone	Methoprene	Pyroquilon	
Flurochloridone	Methoxyfenozide	Quinoxifen	
Fluroxypyr	Mevinphos	Quintozone	
Flurtamone	Milbemectin	Spiroxamine	
Fomesafen	Monocrotophos	Streptomycin	
Glufosinate	Nitenpyram	Sulfur	
Glyphosate	Novaluron	Tebuconazole	
Halosulfuron	Omethoate	Tecloftalam	
Haloxypyr	Oxamyl	Tetraconazole	
Imazamethabenz	Oxydemeton-methyl	Thiabendazole	
Imazamox	Parathion	Thiifluzamide	
Imazapic	Parathion-methyl	Thiophanate methyl	
Imazapyr	Permethrin	Thiram	
Imazaquin	Phenthoate	Tolclofos-methyl	
Imazethapyr	Phorate	Tolyfluanid	
Imazosulfuron	Phosalone	Triadimefon	
Isoprothuron	Phosmet	Triadimenol	
Isoxaben	Phosphamidon	Tricyclazole	
Isoxaflutole	Phoxim	Tridemorph	
Lactofen	Pirimicarb	Triflumizole	
Lenacil	Pirimiphos-ethyl	Triforine	
Linuron	Pirimiphos-methyl	Triticonazole	
MCPA	Profenofos	Validamycin	
MCPA-thioethyl	Propaphos	Vinclozolin	
MCPB	Propargite	Zineb	
Mecoprop	Propoxur	Ziram	

Mefenacet	Prothiofos	Cyamidazosulfamid - IKF-916	
Metamitron	Pymetrozine		
Metazachlor	Pyraclofos	Cyamidazosulfamid- IKF-916	
Methabenzthiazuron	Pyridaben		
Methyl-arsonic acid	Pyridafenthion	Diclocymet - S2900	
Metobromuron	Pyrimidifen	Fenamidone - RPA 407213	
Metolachlor	Pyriproxyfen		
Metosulam	Quinakphos	Fenoxanil - AC382042 /NNF9425	
Metoxuron	Silafluofen		
Metribuzin	Spinosad	Iprovalicarb- SZX722	
Metsulfuron	Sulprofos	MA 565	
Molinate	Tebufenozide	Metominostrobin - SSF-126	
Naproanilide	Tebufenpyrad		
Napropamide	Tebupirimfos	MTF-753	
Naptalam	Teflubenzuron	NF-149	
Nicosulfuron	Tefluthrin	NNF-9850	
Norflurazon	Terbufos	Oxpoconazole fumarate - UBF-910	
Orbencarb	Thiamethoxam		
Oryzalin	Thiocyclam	Picoxystrobin - ZA1963	
Oxadiargyl	Thiodicarb		
Oxadiazon	Thiometon		
Herbicides	Insecticides	Fungicides	
Oxasulfuron	Tralomethrin	Silthiopharm - MON-65500	
Oxyfluorfen	Triazamate		
Paraquat	Triazophos	Simeconazole - F155	
Pendimethalin	Trichlorfon	Trifloxystrobin	

		- OGA279202
Pentoxazone	Triflumuron	
Phenmedipham	Vamidothion	Zoxamide - RH7281
Picloram	Xylyl methylcarbamate	
Pretilachlor	Zeta-Cypermethrin	
Primisulfuron	Acetoprole- RPA115782	
Prometryn	AKD 1022	
Propachlor	Chromafenozide- ANS-118	
Propanil		
Propaquizafop	Clothianidin - TI-435	
Propazine	Dinitefuran - MTI-446	
Propyzamide	Ethiprole-RPA 107382	
Prosulfocarb	Fluacrypyrim - NA-83	
Prosulfuron	Flupyrazofos	
Pyraflufen- ethyl	Phosphocarb - BAS301	
Pyrazolate		
Pyrazosulfuron	Protrifenbute - FMC 111869	
Pyrazoxyfen		
Pyribenzoxim	Thiacloprid - BAYYRC2894	
Pyributicarb		
Pyridate	Tolfenpyrad - OMI-88	
Pyriminobac- methyl		
Pyriothiobac		
Quinclorac		
Quinmerac		
Quinoclamine		
Quizalofop		

Quizalofop-P-tefuryl		
Rimsulfuron		
Sethoxydim		
Simazine		
Sulcotrione		
Sulfentrazone		
Sulfometuron		
Sulfosate		
Sulfosulfuron		
Tebuthiuron		
Terbacil		
Terbumeton		
Terbuthylazine		
Terbutryn		
Thenylchlor		
Thiazopyr		
Thifensulfuron		
Thiobencarb		
Herbicides		
Tralkoxydim		
Triallate		
Triasulfuron		
Tribenuron		
Triclopyr		
Trifluralin		
Triflusulfuron		
Amicarbazone-BAYMKH3586		
Azafenidin-DPX-R6447		
Beflubutamid-UBH-820		
Benzfendizone - FMC 143686		
Benzobicyclon -SB-500		
Butafenacil - CGA 276854		
Fentrazamide - BAYYRC2388		
Florasulam - DE570		

Fluazolate - JV485
Flucarbazone - BAYMKH6562
Flufebpyr-ethyl - S-3453
Foramsulfuron - AEF 130360
Indanofan - MK-243
Iodosulfuron - AEF 115008
Isoxadifen -AEF122006
KPP421
Mesosulfuron - AEF 130060
Mesotrione - ZA1296
MTB-951
OK-9701
Oxaziclomefone-MY-00
Penoxsulam - DE638
Pethoxamid - TKC-94
Picolinofen - AC900001
Propoxycarbazone (proposed) BAYMKH6561
Pyriftalid - CGA279233
Tepraloxydim - BAS620H/NP61EC
Triaziflam - IDH 1105
Trifloxysulfuron (Na salt) - CGA362622
Tritosulfuron

Preferably, however, the silicon dioxide granules employed according to the invention function as a carrier. The present invention therefore also relates to an adsorbate of the silicon dioxide granules described above and at least one of these substances.

The term "adsorbate" as used herein includes the adsorption of a substance not only on to the surface of the silicon dioxide, but also into the pores, as well as the

"intercalation" into the intergrain volumes. "Adsorbate" can also mean that silicon dioxide granules or fragments thereof envelop solid particles or liquid droplets of the substance. In the latter case the forces of attraction
5 between the particles or droplets are reduced and, for example, the flow properties are improved or the merging of droplets is impeded.

The ratio of amounts of substance to silicon dioxide granules in the adsorbate can be chosen as desired as a
10 function of the properties of the substance and the requirements for the end product. Preferably, however, 0.001 to 200 g of substance are employed per 100 g of silicon dioxide granules, particularly preferably 10 to 150 g.

15 In a preferred embodiment, granules based on pyrogenically prepared silicon dioxide of average particle diameter from 10 to 120 μm and BET surface area from 40 to 400 m^2/g (determination in accordance with DIN 66 131 with nitrogen) can be used as the silicon dioxide granules.

20

The silicon dioxide granules furthermore preferably have the following physico-chemical characteristic data, which are determined as described in EP PS 0 725 037:

Pore volume: 0.5 to 2.5 ml/g

25 Pore size volume: less than 5% of the total pore volume has a pore diameter of less than 5 nm, remainder meso- and macropores

pH: 3.6 to 8.5

Tamped density: 220 to 700 g/l.

30

Granules which are suitable for the use according to the invention and the preparation thereof are described, for example, in EP OS 0 727 037.

5 An example of a process for the preparation of the adsorbate according to the invention comprises:

Melting of the substance(s) to be adsorbed, chosen from foodstuffs additives, such as dyestuffs, antioxidants, preservatives, emulsifiers, gelling agents, thickeners and binders, stabilizers, alkalis, acids, salts, antilumping
10 agents, flavour intensifiers, sweeteners, aromas, feedstuffs additives, chemical intermediates and plant protection agents, such as, for example, herbicides, insecticides and fungicides, or distribution, i.e. dissolving, suspending or emulsifying, thereof in a
15 solvent;

mixing of the granules based on pyrogenically prepared silicon dioxide with the mixture from step (a); and where appropriate removal of the solvent.

"Solvent" also includes mixtures of several different
20 solvents. It goes without saying, furthermore, that substances which are already liquid at room temperature can be subjected to the mixing in step (b) without prior processing, since in this case the "melting operation" has already taken place. Mixing step (b) can be carried out
25 either by adding the mixture from step (a) to the silicon dioxide granules, for example by spraying on, or vice versa. In both cases, the addition can be made in one amount or in portions. The duration of the mixing in step (b) depends here above all on the adsorption properties of
30 the substance to be adsorbed on the silica surface. If a solvent is present, step (a) and (b) are carried out at a temperature which lies between the freezing and boiling point of the solvent. The solvent, where appropriate in

excess, is preferably removed in step (c) at elevated temperature and/or under reduced pressure.

The removal of the solvent in step (c) can also be carried out by spray drying or fluidized bed drying, shaping taking place at the same time. In the case of a granule-containing melt, the shaping process can accordingly be an extrusion.

The adsorbates according to the invention can be used for the preparation of powders, liquids, foams, sprays, gels, creams, ointments, pastes, sticks and tablets.

10 The adsorbates according to the invention can additionally be shaped. They can be processed, for example, to pellets, larger granules, extrudates etc.

The advantage of the adsorbates according to the invention lies in their excellent flow properties, the low water content and the high purity of the starting granules. They offer a very good possibility for dispersing substances which are difficult to meter, and are easy to handle.

20 When handling the adsorbates, the hazard potential to the administering person during use on toxic substances, such as plant protection agents or aggressive skin-irritating substances, can be reduced significantly.

When the adsorbate according to the invention is used, a uniform distribution of the active compound can be achieved.

25 The invention is now to be explained in more detail with the aid of examples.

Preparation of granules based on pyrogenically prepared silicon dioxide

5 The pyrogenically prepared silicon dioxide AEROSIL 300, commercially obtainable from Degussa AG, is used as the starting compound.

10 The pyrogenically prepared silicon dioxide is dispersed in completely demineralized water. A dispersing unit which operates by the rotor/stator principle is used here. The suspension formed is spray dried. The finished product is separated off via a filter or cyclone. The heat treatment of the spray granules is carried out in a muffle oven.

The preparation parameters are shown in table 1.

Table 1

Starting SiO ₂	AEROSIL 300
Spray drying data	
Amount of H ₂ O (kg)	100
Amount of SiO ₂ (kg)	10
Atomization with	disc atomizer
Operating temperature (°C)	480°C
Waste air temperature (°C)	103°C
Separation	filter
Physico-chemical data	
BET surface area (m ² /g)	298
Particle size d ⁵⁰ (μm)	30
Tamped volume (g/l)	283
pH	4.7

Examples

1. Starting materials

1.1 Model liquids

5 Vitamin E acetate, silicone oil, paraffin oil and eucalyptus oil are used as model liquids for the fields of use according to the invention. Vitamin E acetate is used, for example, in the nutrition of animals and humans, and eucalyptus oil as an aromatic or aroma substance.

Example	Product	Product name	Manufacturer
1	Vitamin E acetate		BASF
2	Silicone oil	Silicon Fluid 345	Dow Corning
3	Paraffin oil	Paraffinöl dünnflüssig	Merck
4	Eucalyptus oil	Oleum Eucalypti 80-85%	Caelo

1.2 Carrier silicas

Silica	Loss on drying (wt.%)	Loss on ignition (wt.%)	SiO ₂ content (wt.%)	Slope angle (°)	Bulk density (g/l)
Example 1-4 AEROPERL® 300/30 (Degussa)	1.7	2.1	99.9	34.97	232.8
Comparison example 1 SIPERNAT® 22 (Degussa)	4.8	4.4	98.0	38.99	211
Comparison example 2 SIPERNAT® 50 (Degussa)	4.5	4.9	98.5	52.67	136.67
Comparison example 3 Syloid 244 FP (Grace)	5.9	3.9	nd	50	92

Granulated pyrogenic silica (AEROPERL® 300/30) has a significantly lower water content (loss on drying and ignition) and a higher silicon dioxide content than the silicas used in the comparison examples. Furthermore, it is free from sulfates, typical impurities of precipitated silica and silica gels, and has the best flowability (the lowest slope angle).

10 2. Procedure:

50 g of carrier silica are initially introduced into a 2 litre three-necked flask equipped with a blade stirrer. 50 g of the model liquids from examples 1-4 are added dropwise from a dropping funnel in the course of 60 minutes, while stirring at a stirrer speed of 100 revolutions / minute. Comparison examples 1-3 are carried out with eucalyptus oil. The liquid-silica adsorbates are

then sieved manually three times through a 0.8 mm sieve and left to stand overnight in a closed screw-cap glass bottle. The following day, the liquid-silica adsorbates are characterized by the following methods:

5

Flow rating by means of glass flow vessels in accordance with the publication series Pigmente No. 31 "AEROSIL zur Verbesserung des Fließverhaltens pulverförmiger Substanzen", Degussa AG, Düsseldorf.

10 Poured cone height (cm) or slope angle ($^{\circ}$) in accordance with the publication series Pigmente No. 31. The slope angle is obtained from the poured cone height via the equation

$$\tan(\text{slope angle}) = (\text{poured cone height} / 0.5 \text{ cone diameter})$$

15 Bulk density (g/l) in accordance with DIN standard 6613.

3. Results

	Flow rating	Slope angle (°)	Bulk density (g/l)
Example 1 AEROPERL / Vitam. E	2	30.1	501
Example 2 AEROPERL / Silicone oil	2	37.2	475
Example 3 AEROPERL / Paraffin oil	2	38.7	497
Example 4 AEROPERL / Eucalyptus oil	2	37.2	594
Comparison example 1 SIPERNAT 22	3	46.0	450
Comparison example 2 SIPERNAT 50	4	63.9	353
Comparison example 3 Syloid FP 244	6	56.7	201

The liquid-silica adsorbates prepared with granulated pyrogenic silica (AEROPERL® 300/30) are distinguished by a good flowability (flow rating 2, slope angle < 40°C). In contrast, the liquid-silica adsorbates from comparison examples 1 to 3 show a significantly lower flowability. The latter moreover have significantly lower bulk densities.

Liquid-silica adsorbates with a good flowability and high bulk volume are advantageous for carrier uses. Furthermore, carrier silicas should have the lowest possible water content and should be very pure, in order to avoid decomposition of the adsorbed liquids under the (catalytic) influence of water or impurities, such as, for example,

sulfates. The experiments show that granulated pyrogenic silica meets all these requirements.

Patent claims:

1. Use of granules based on pyrogenically prepared silicon dioxide as a carrier for substances chosen from the group consisting of foodstuffs additives, such as
5 dyestuffs, antioxidants, preservatives, emulsifiers, gelling agents, thickeners and binders, stabilizers, alkalis, acids, salts, antilumping agents, flavour intensifiers, sweeteners, aromas, feedstuffs additives, chemical intermediates and plant protection agents,
10 such as, for example, herbicides, insecticides and fungicides.
2. Use according to claim 1, characterized in that the silicon dioxide granules are silanized.
3. Adsorbate of granules based on pyrogenically prepared
15 silicon dioxide and at least one substance chosen from the group consisting of foodstuffs additives, such as dyestuffs, antioxidants, preservatives, emulsifiers, gelling agents, thickeners and binders, stabilizers, alkalis, acids, salts, antilumping agents, flavour
20 intensifiers, sweeteners, aromas, feedstuffs additives, chemical intermediates and plant protection agents, such as herbicides, insecticides and fungicides.
4. Adsorbate according to claim 3, characterized in that the silicon dioxide granules are silanized.
- 25 5. Dyestuff comprising granules based on pyrogenically prepared silicon dioxide.
6. Antioxidant comprising granules based on pyrogenically prepared silicon dioxide.
7. Preservative comprising granules based on pyrogenically
30 prepared silicon dioxide.

8. Emulsifier comprising granules based on pyrogenically prepared silicon dioxide.
9. Gelling agent comprising granules based on pyrogenically prepared silicon dioxide.
- 5 10. Thickener comprising granules based on pyrogenically prepared silicon dioxide.
11. Binder comprising granules based on pyrogenically prepared silicon dioxide.
12. Stabilizer comprising granules based on pyrogenically prepared silicon dioxide.
- 10 13. Alkali comprising granules based on pyrogenically prepared silicon dioxide.
14. Acids comprising granules based on pyrogenically prepared silicon dioxide.
- 15 15. Salts comprising granules based on pyrogenically prepared silicon dioxide.
16. Antilumping agent comprising granules based on pyrogenically prepared silicon dioxide.
17. Flavour intensifier comprising granules based on pyrogenically prepared silicon dioxide.
- 20 18. Sweetener comprising granules based on pyrogenically prepared silicon dioxide.
19. Aroma comprising granules based on pyrogenically prepared silicon dioxide.
- 25 20. Feedstuffs additives comprising granules based on pyrogenically prepared silicon dioxide.
21. Chemical intermediates comprising granules based on pyrogenically prepared silicon dioxide.

22. Plant protection agents comprising granules based on pyrogenically prepared silicon dioxide.
23. Herbicides comprising granules based on pyrogenically prepared silicon dioxide.
- 5 24. Insecticides comprising granules based on pyrogenically prepared silicon dioxide.
25. Fungicides comprising granules based on pyrogenically prepared silicon dioxide.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP2004/006719

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C01B33/18 B01J20/10 C09C1/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C01B B01J C09C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

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INTERNATIONAL SEARCH REPORT

International Application No
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